2011 Military Health System Conference

Forecasting Capacity in the MHS

Case Study: Capacity Planning in the National Capital Region

The Quadruple Aim: Working Together, Achieving Success

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Overview

Purpose:

- Discuss innovative ways to manage capacity, increase quality of patient care and improve operations in the Military Health System (MHS).

Objectives:

- Define Capacity and its impact on MTF's
- Explain Decision Dynamics methodology
  - Case study: capacity planning for orthopedics in the National Capital Region.
- Use of Decision Dynamics for operational improvements.

Capacity Definitions

- **Conventional Capacity** (40 hrs/wk) : baseline capacity, includes time for vacations, training, research, and residents
- **Contingency Capacity** (60+ hrs/wk): additional surge capacity requirements based a sustained increase in caseload, usually requires limited time for other time demands
- **Crisis Capacity** (90+ hrs/wk): extreme conditions that require maximum staff utilization for brief periods of time, usually lasting no longer than a few days

Factors Influencing MTF Capacity

- Facilities/Supplies
  - Beds (ICU, Inpt)
  - OR's
  - Rehab Space
  - Housing
  - Logistics/Equipment
- Staffing:
  - Providers/Case Manager
  - Lab/Rad/Pharm
  - Admin Support
  - WTU / Support Programs
  - Contracting
- Complexity of Patients:
  - Head Trauma
  - SCI
  - Multiple Limb Amputee
  - Burns
- Other Missions:
  - Readiness
  - Education
  - Staff Turnover
  - Research
  - Dependent/Retiree Care
  - BRAC

Impact of Capacity Demands

- Budget & Resource Planning
- Staffing Flexibility
- Appropriate Contracts in Place
  - Logistics and Staffing
- Trainee Education / ACGME Accreditation
- Research Productivity
- Staff Burn-out and Attrition
- Patient Safety / Outcomes
- Medical Regulation

Capacity Planning

Why Capacity Planning?

Planning for patient caseload, staffing, equipment, space, and technology.

How many patients can you see?

It Depends…..

Why is this so difficult to answer???

Healthcare Capacity Planning

- Traditional Capacity Factors
  - Staff, patient case mix, processes, space, and technology / equipment

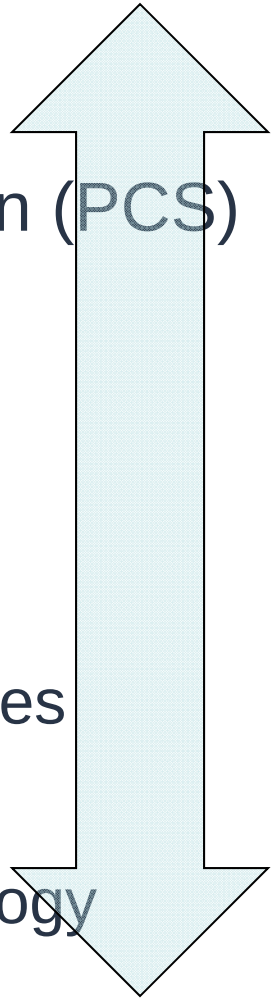
The more stable each of these factors, the easier it is to forecast capacity

- Staffing: residents, graduate medical education, and research
- Patient Mix: trauma center

Military Healthcare Capacity Planning

Additional Capacity Factors for the Military

- Staff:
  - deployments and permanent change of station (PCS)
- Patients:
  - Wounded warriors
  - Recapture
- Processes:
  - "Joint" or shared facilities require aligned processes
- Technology:
  - Each service and MTF can have different technology solutions



The Two Factors

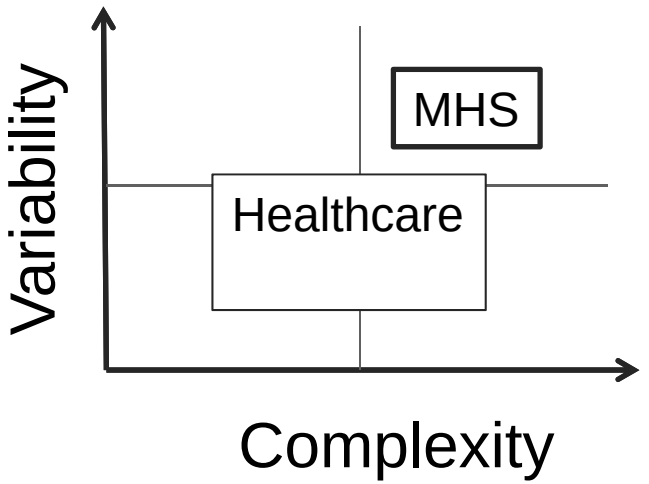
Complexity

- Composed of many interconnected parts.

  A complex patient care plan

- So intricate as to be hard to understand or manage.

  A complex problem



Variability

- Capable of being varied or changed.

  Number of orthopedic surgeons in March

- A quantity that may assume any given value or set of values.

  The length of time it takes to perform an amputation

Operations Planning Options

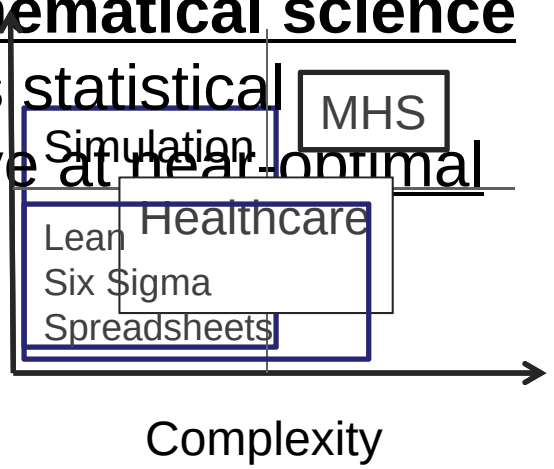
Originating in military efforts prior to World War II, **Operations Research (OR)** is an interdisciplinary **mathematical science** that employs traditional techniques such as statistical analysis, modeling and optimization to arrive at near-optimal solutions to complex operational problems.

Business Process Engineering (BPE)

- Lean
- Six Sigma

Operations Forecasting

- Simulation
- Spreadsheet analysis



Why can't we solve these problems?

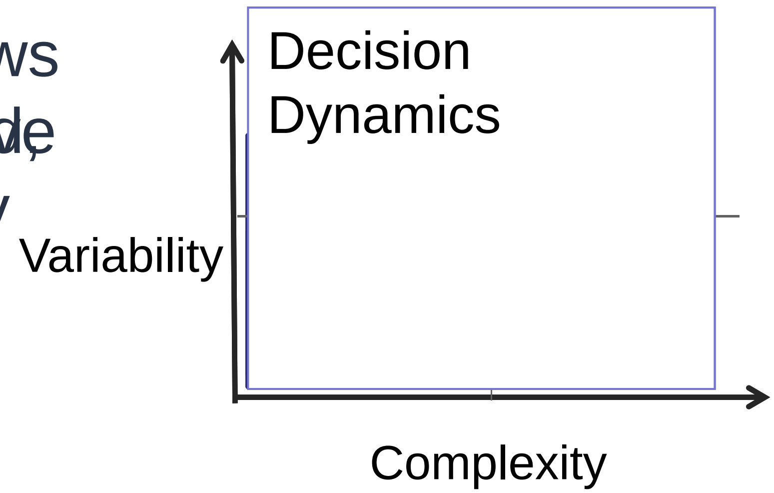
- Ground-up analysis, lost sight of the forest for the trees
- One-time snapshot analysis, no iterations

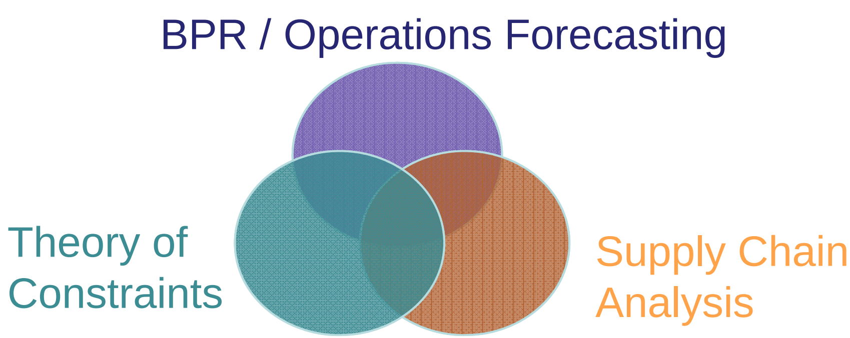
Decision Dynamics

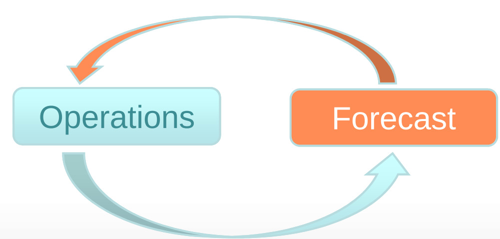
Complexity Theory:
"The New Science" in Operations Research

- Complexity Theory focuses on understanding the relationships that allows organizations to evolve, adapt and thus improve the way they manage chaotic systems.

- Decision Dynamics utilizes applied traditional methodologies to highly dynamic environments and to solve a wider range of problems.





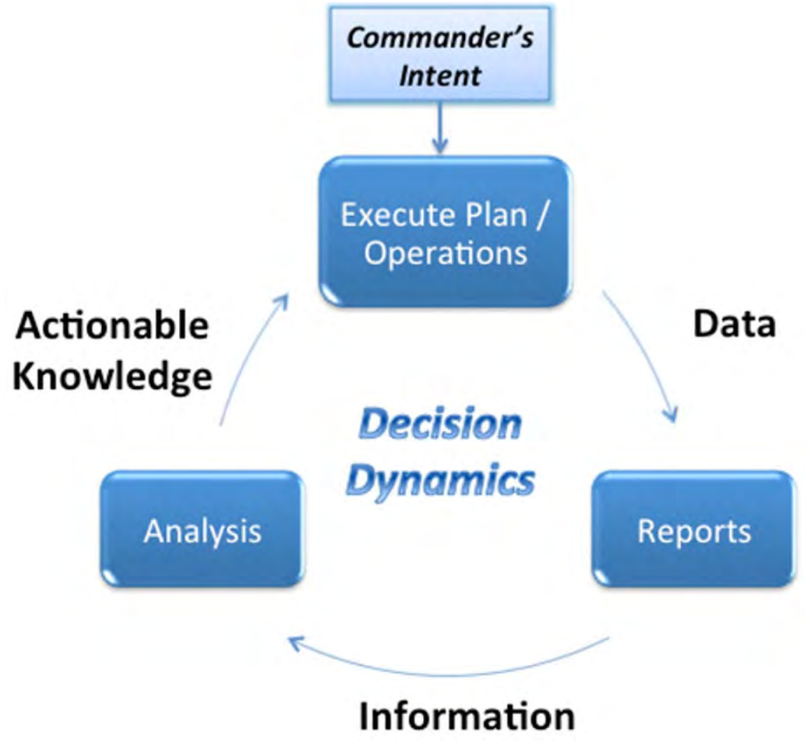


OVERVIEW OF DECISION DYNAMICS METHODOLOGY

Decision Dynamics Methodology

Commander's Intent

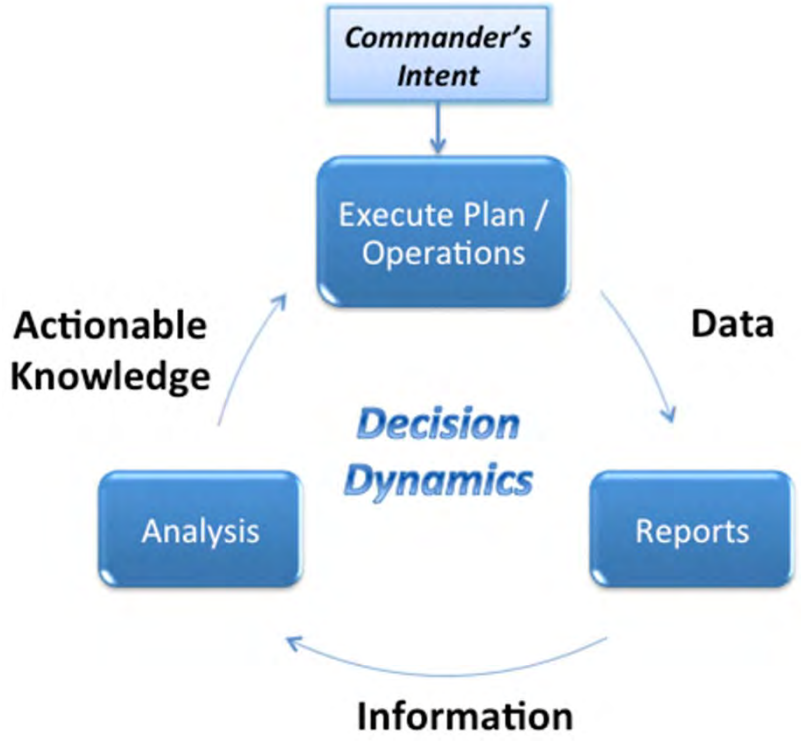
- Provides clear and concise purpose
- Provides the direction of the operations and the ultimate end state
- Provides focus in the absence of specific orders
- Ultimately drives plans and operations as well as defining acceptable risk
- Guides priorities for analysis



Decision Dynamics Methodology

Execute Plan / Operations

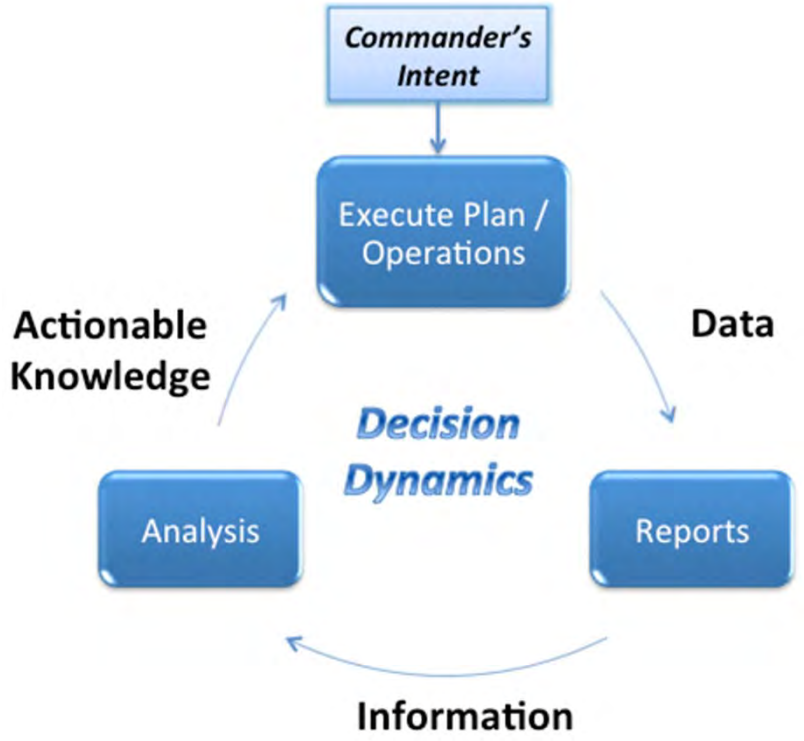
- Actual work being done
- Operations: surgeons in the operating room, ICU nursing staff
- Projects: prioritization and execution of activities
- Generates transaction level data



Decision Dynamics Methodology

Reports

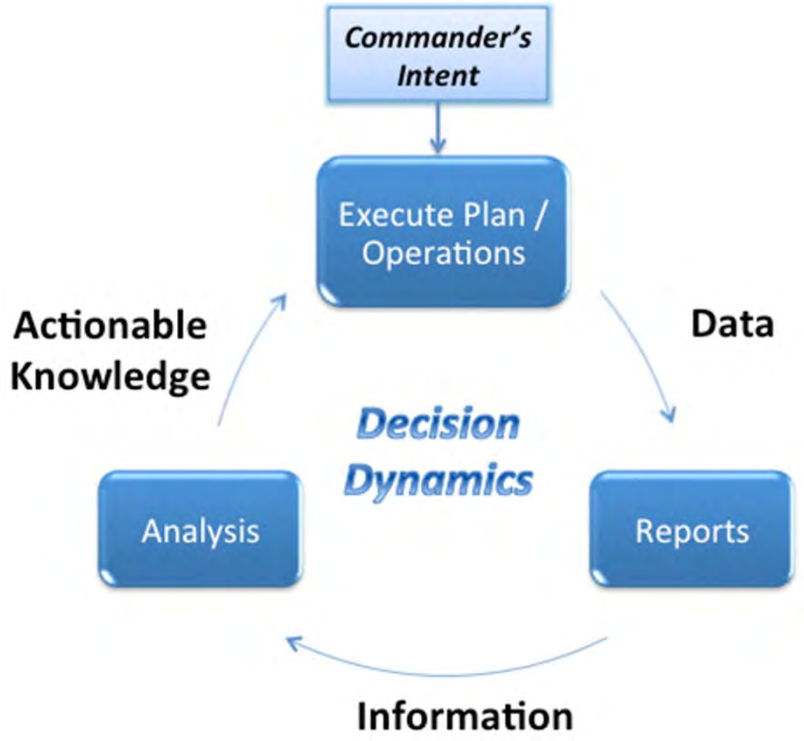
- Status based on the summation of some of the transactional data
- Reports tend to be periodic and unidirectional
- Questionable requirements for many reports
- Frequently not used to manage operations



Decision Dynamics Methodology

Analysis

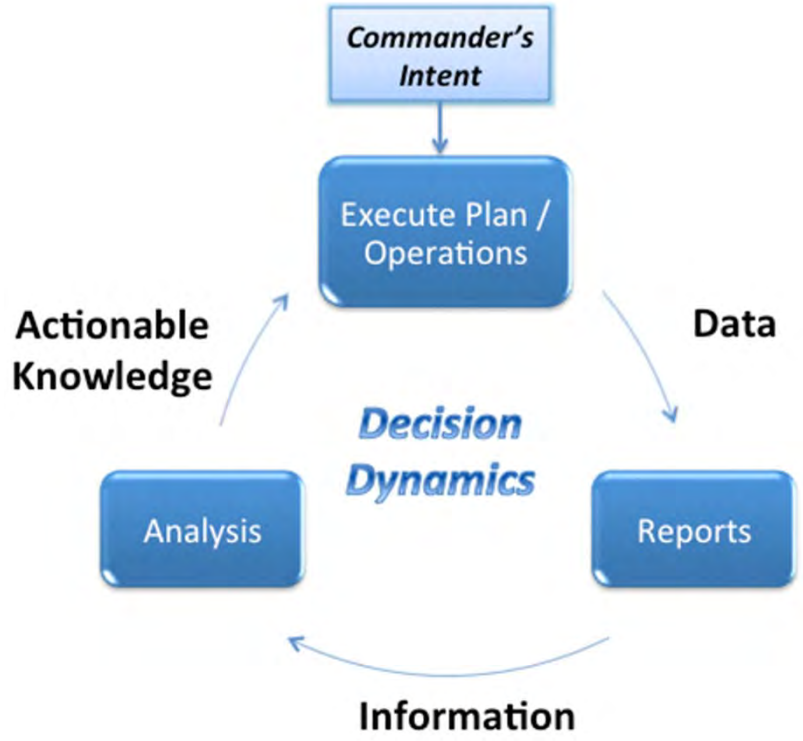
- Evaluate data and operational processes to determine Blocks and Drivers
- Determine operational capacity based upon Block or “bottleneck”
- Forecast operational thresholds for balanced capacity management



Decision Dynamics Methodology

Execute Plan / Operations

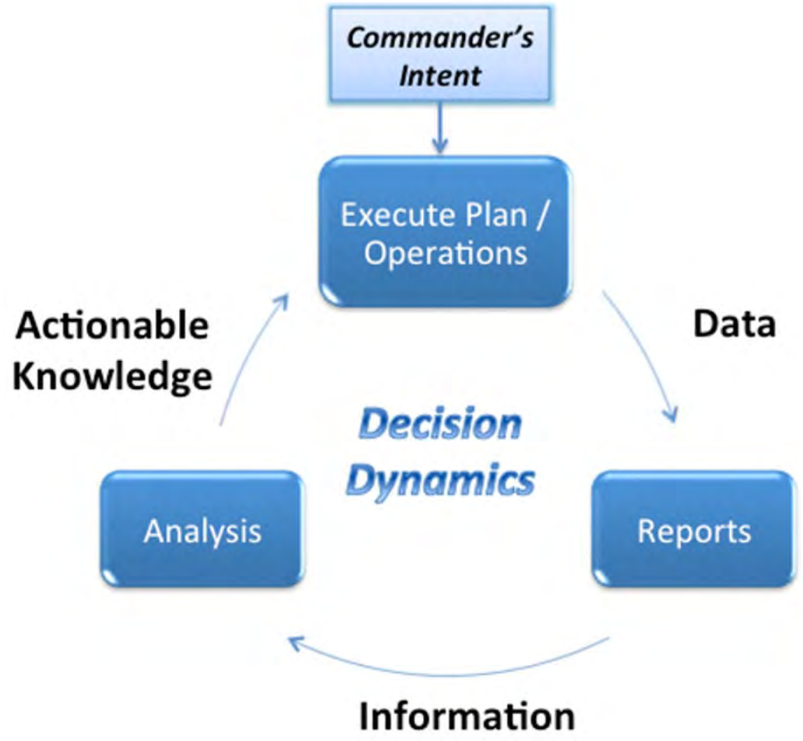
- Utilize Operational Analysis Reports (OARs) to manage capacity and operational improvements through:
  - Regulation of patients
  - Staff caseload / workload balancing
  - Space utilization and planning
  - Target operational improvements
- Document required operational data to track Drivers and Blocks and ensure OARs are updated



Decision Dynamics Methodology

Reports

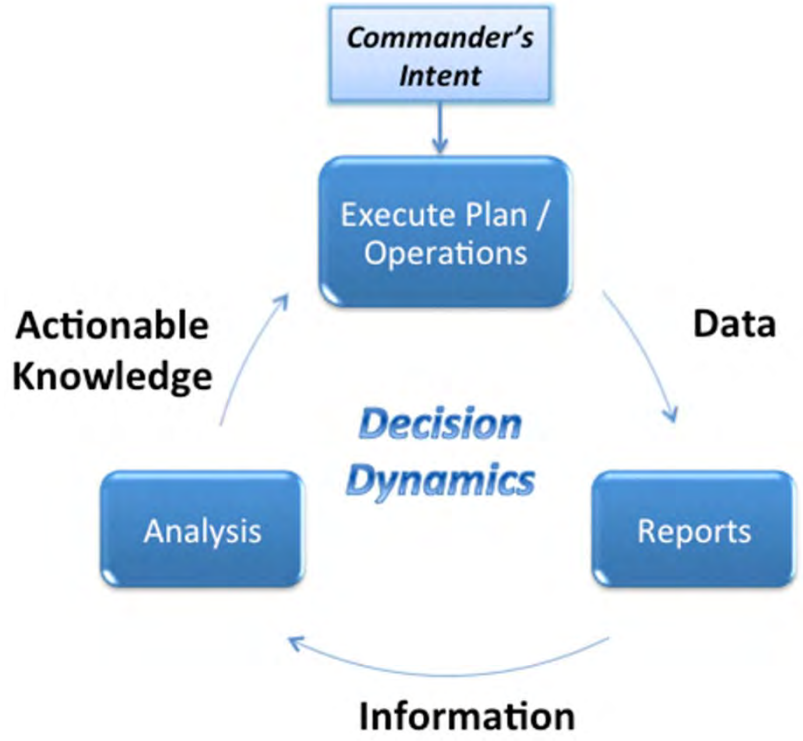
- Periodically create reports with related Blocks and Drivers data in a standard business intelligence tool



Decision Dynamics Methodology

Analysis

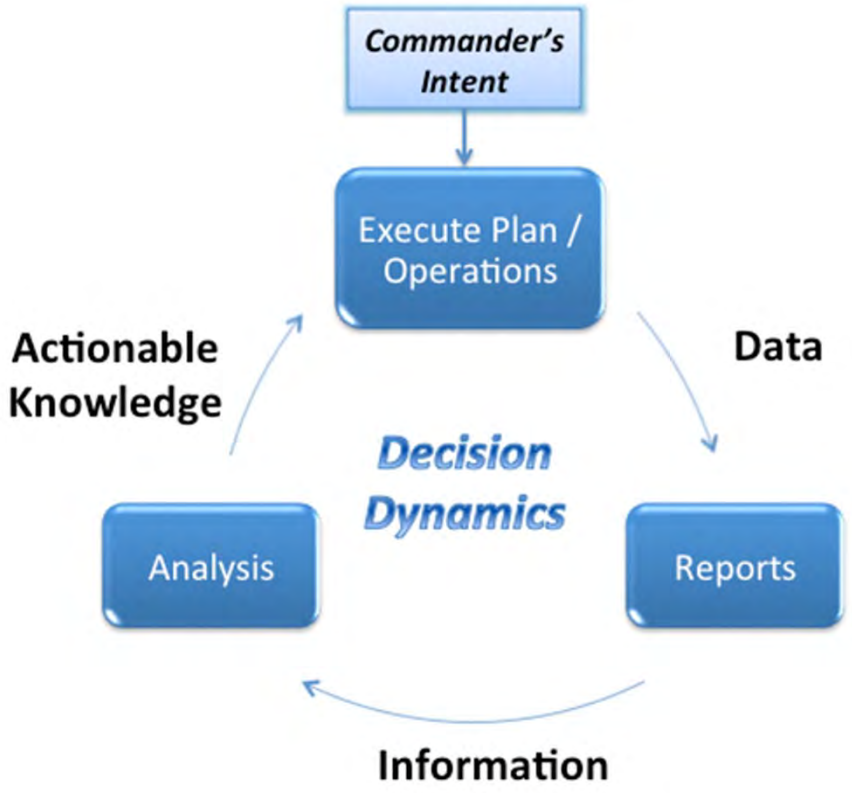
- Evaluate Blocks and Drivers data to forecast capacity and operational improvements
- Develop OARs to be distributed through Operations



CASE STUDY: ORTHOPEDIC CAPACITY AT WRAMC

Analysis Steps

1. Identify Blocks
2. Determine Phases
   - patient length of stay
3. Evaluate Caseload
4. Determine Capacity and Mitigation Strategies



Step 1: Identify Blocks
- Staff Constraints -

WRAMC Staff * Caseload per Staff Member
Conventional Capacity

	ICU Patients	IP Trauma (Routine)	IP Trauma (Complex)	IP Trauma (Rehab)	OP Trauma (Routine)	OP Trauma (Complex)
Ortho Surgeon	8	10	9	35	75	50
PM&R Physician	25	35	30	16	40	30
Physical Therapist	10	20	15	10	16	10
Occupational Therapist	8	15	12	8	12	8

* Illustration Example: data for concept discussions only

Step 1: Identify Blocks (cont)
- Staff Constraints -

WRAMC Staff *

	Current Staff	ICU Patients	IP Trauma (Routine)	IP Trauma (Complex)	IP Trauma (Rehab)	OP Trauma (Routine)	OP Trauma (Complex)
Ortho Surgeon	6	48	60	54	210	450	300
PM&R Physician	3	75	105	90	48	120	90
Physical Therapist	9	90	180	135	90	144	90
Occupational Therapist	7	56	105	84	56	84	56

- *Initial staff constraints are orthopedic surgeons and occupational therapists.*

* Illustration Example: data for concept discussions only

Step 2: Determine Phases
- Wounded Warriors Recovery Phases -

- Wounded Warrior Phases include ICU, Inpatient, and Outpatient.
- Patients are distributed by percentage for each phase and by patient category.

ICU (40%) → Inpatient (100%) → Outpatient (100%)

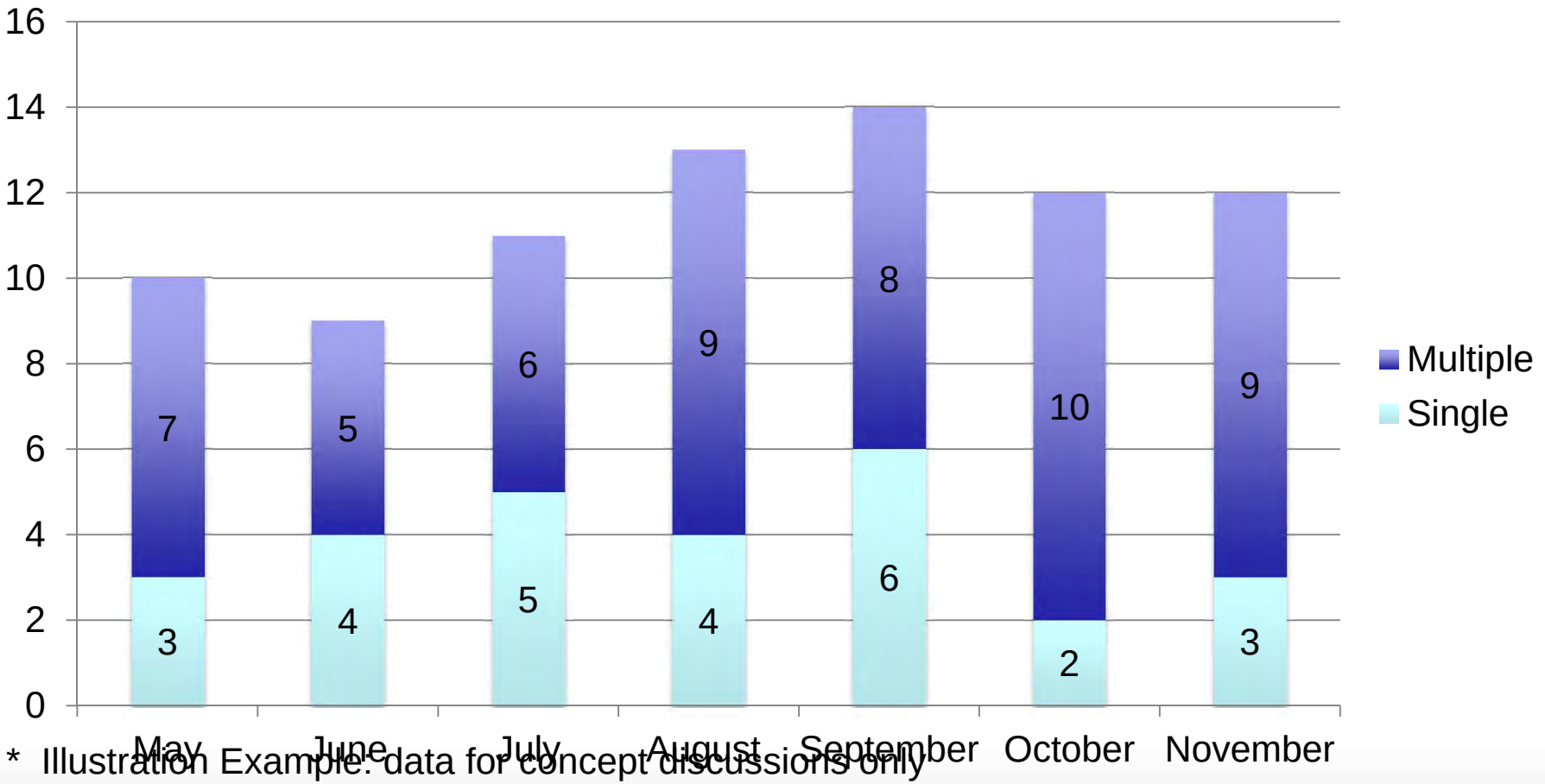
Type	LoS	%
ICU	1.1	n/a

Type	LoS	%
Complex	1.7	48%
Routine	1.5	37%
Rehab	.8	15%

Type	LoS	%
Complex	9	63%
Routine	7	37%

* Illustration Example: data for concept discussions only

Step 3: Evaluate Caseload
-Arrivals of Wounded Warriors-



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Step 4: Caseload Distribution

Caseload Across Recovery Phases *

	ICU Patients	IP Trauma (Routine)	IP Trauma (Complex)	IP Trauma (Rehab)	OP Trauma (Routine)	OP Trauma (Complex)	Total Utilization
Ortho Surgeon	7%	22%	11%	1%	6%	23%	70%
PM&R Physician	5%	5%	15%	3%	58%	30%	116%
Physical Therapist	4%	3%	10%	2%	18%	77%	114%
Occupational Therapist	6%	5%	16%	3%	32%	124%	186%

* Illustration Example: data for concept discussions only

Step 4: Determine Capacity and Mitigation Strategies

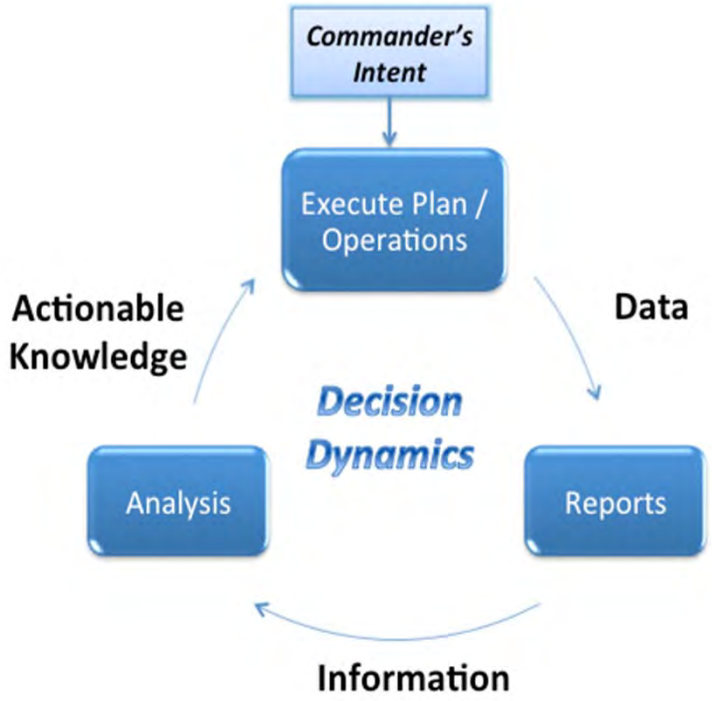
- Current caseload: Approximately 12 new amputees per month
- Current patient caseload is almost double the capacity for occupational therapists.

- Mitigation strategies
  - Setting regulation thresholds closer to 6 patients total per month thereby regulating approximately 50% of patients elsewhere.
  - Adding occupational therapists.
  - Move warriors out of the NCR sooner thereby decreasing the demand on occupational therapists.
  - Reallocation of tasks to OT Techs or other staff members.

Operations - OARs

- Operational Analysis Reports (OARs) are periodically to all levels of management

- **Chief of Orthopedic Surgery and Occupational Therapy**
  - Reporting period: Weekly OARs
  - Staff workload distribution – determine where staff spends most of their time
  - Identify Block tasks –
    - Determine if other staff can fulfill tasks
    - Determine if non-patient tasks or time demands can be removed or reduced
    - Target for operations improvement efforts



Step 4: Caseload Distribution

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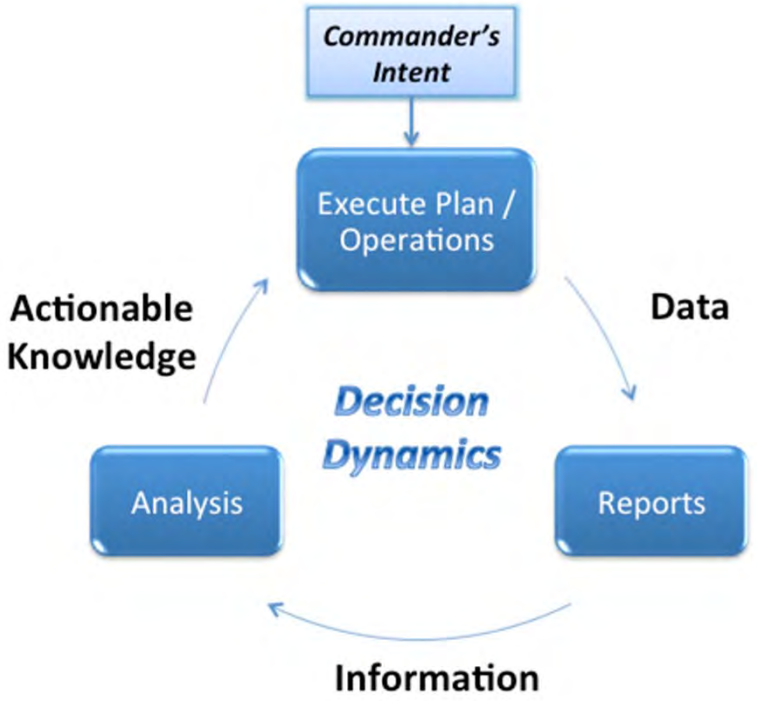
* Illustration Example: data for concept discussions only

Operations - OARs

- **Deputy Commander of Clinical Services**
  - Reporting period: Monthly OARs
  - Staff utilization trends– balance staff to caseload
  - Block changes – target larger operations improvement efforts
  - New patient caseload thresholds – forecast when operations will be at maximum capacity
  - Align Commanders Intent – redirect staff activities given surge requirements



Operations - OARs

Commander

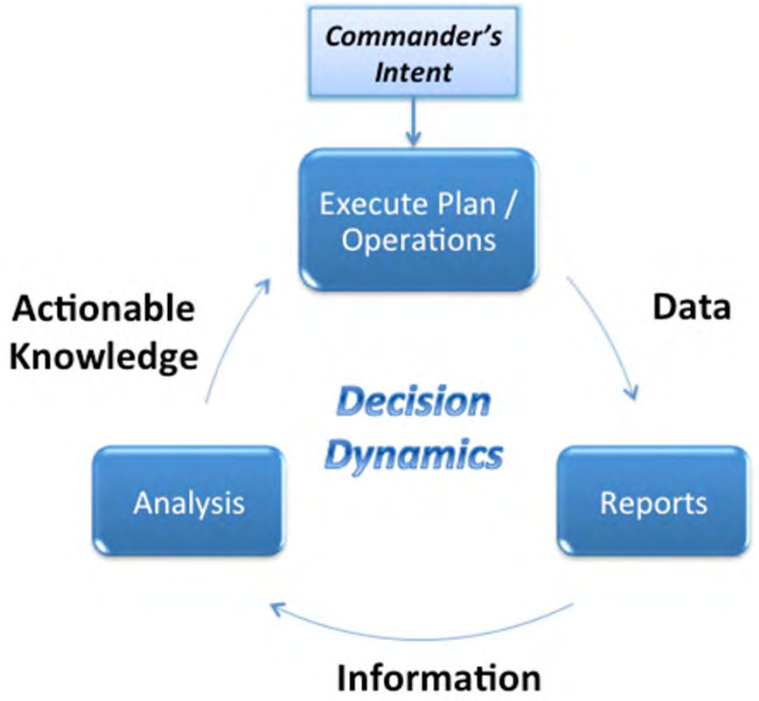
•Reporting period: Quarterly OARs

•Patient caseload and staff utilization trends -

- Understand when MTF is reaching capacity by service or patient category
- Determine if staff numbers and utilization trend with caseload

•Identity primary Blocks –

- Determine if MTF wide changes are required
- Example: improved IT systems

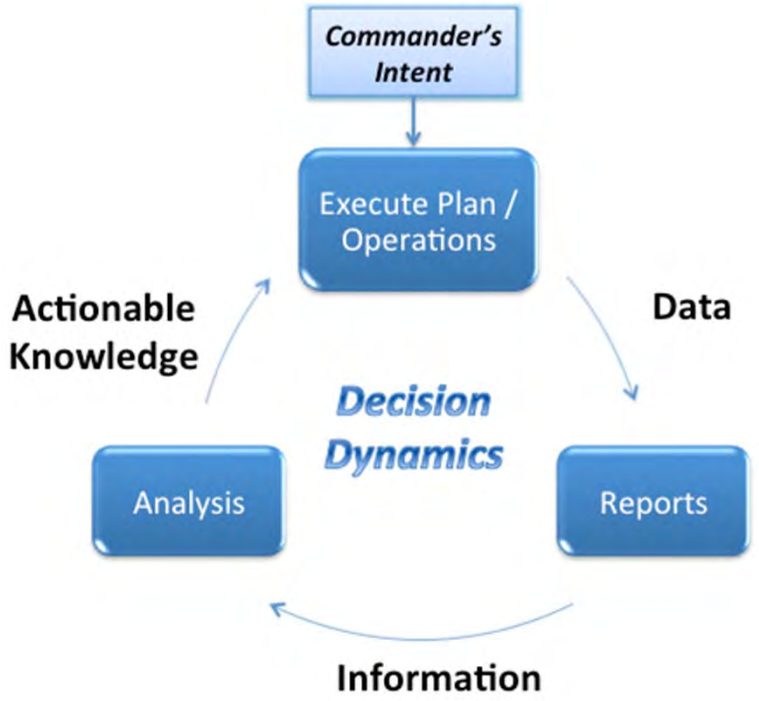


Operations - OARs

Commander

•Distribute Commander's Intent

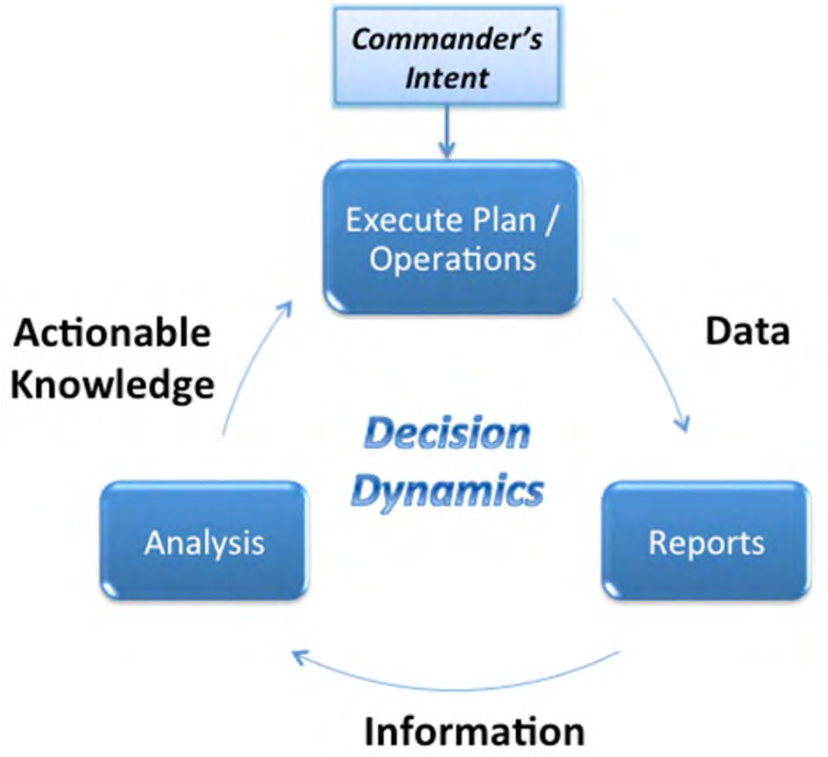
- Higher or lower capacity
- Recapture targets
- Education targets
- Improved care
- Staff balancing



Reports

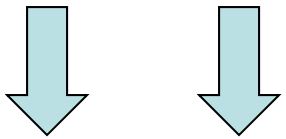
- Utilize existing BI tools to collect data

- Collect Data on:
  - Patient arrivals
  - Staff availability
  - Space availability

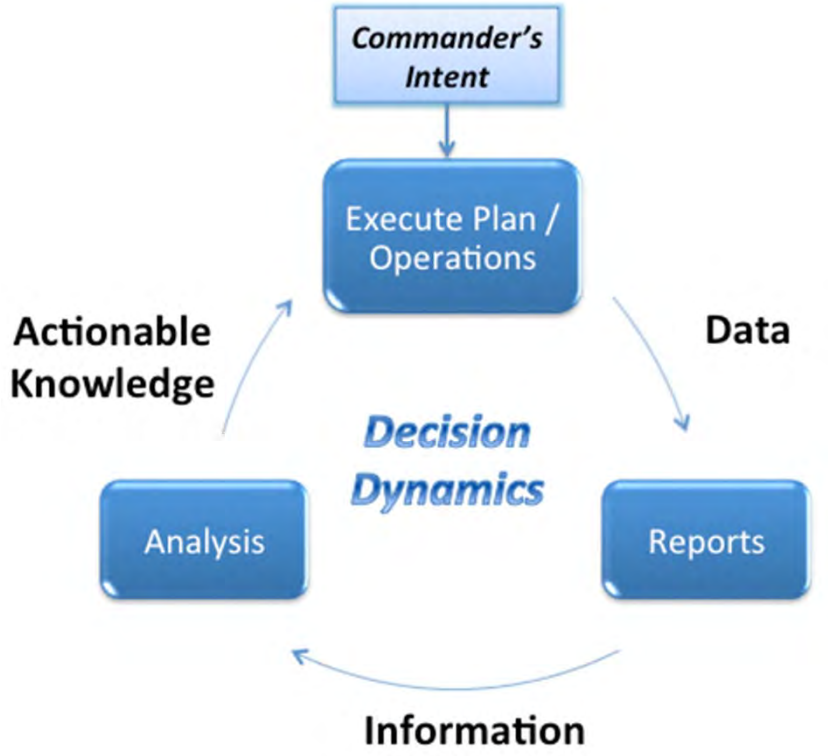


Analysis Steps

- Evaluate staff changes
- Evaluate patient changes
- Evaluate space and equipment changes



- Update Blocks
- Evaluate Caseload
- Determine Thresholds

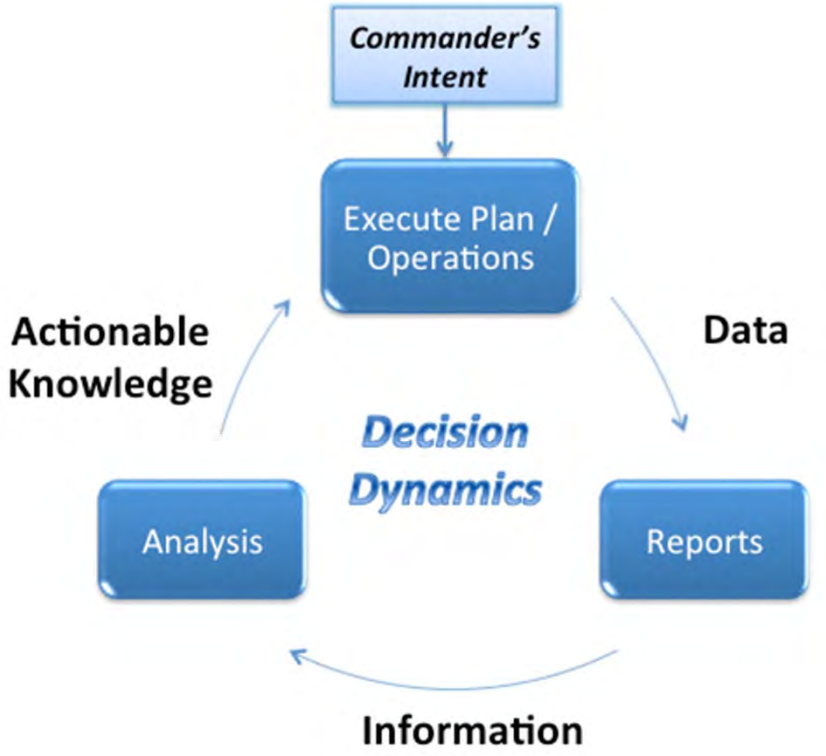


OPERATIONAL ENHANCEMENTS: USING DECISION DYNAMICS TO IMPROVE QUALITY, LOWER COST, OR IMPROVE TIME

Analysis

Identify ~~Blocks~~ *Drivers*

- Determine process flows to identify Drivers. *
- Utilize Operations Research analysis techniques to determine correlation between Drivers and operational performance factors.

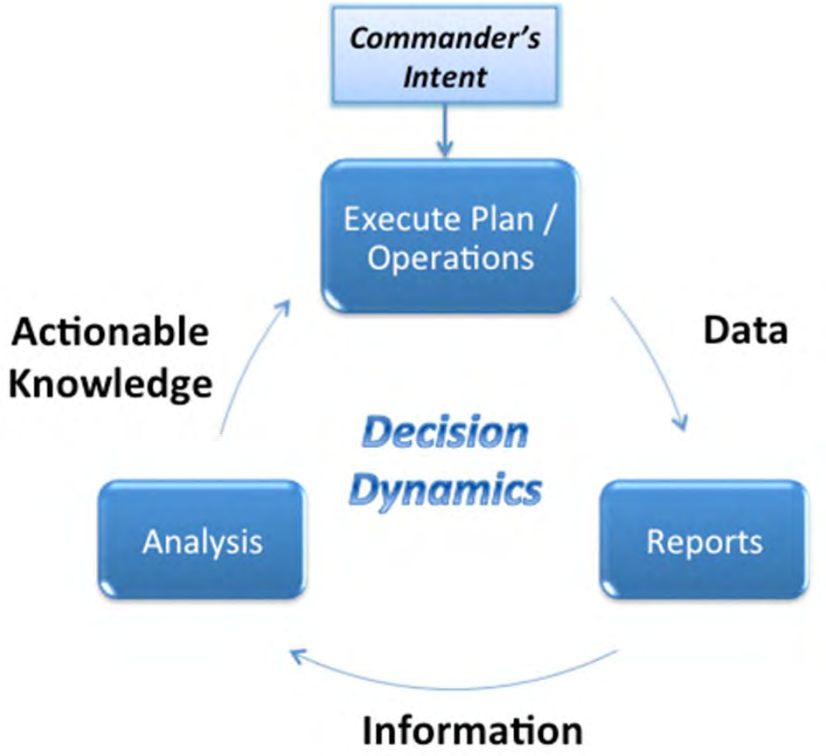


* Detailed in Decision Dynamics Methodology

Analysis

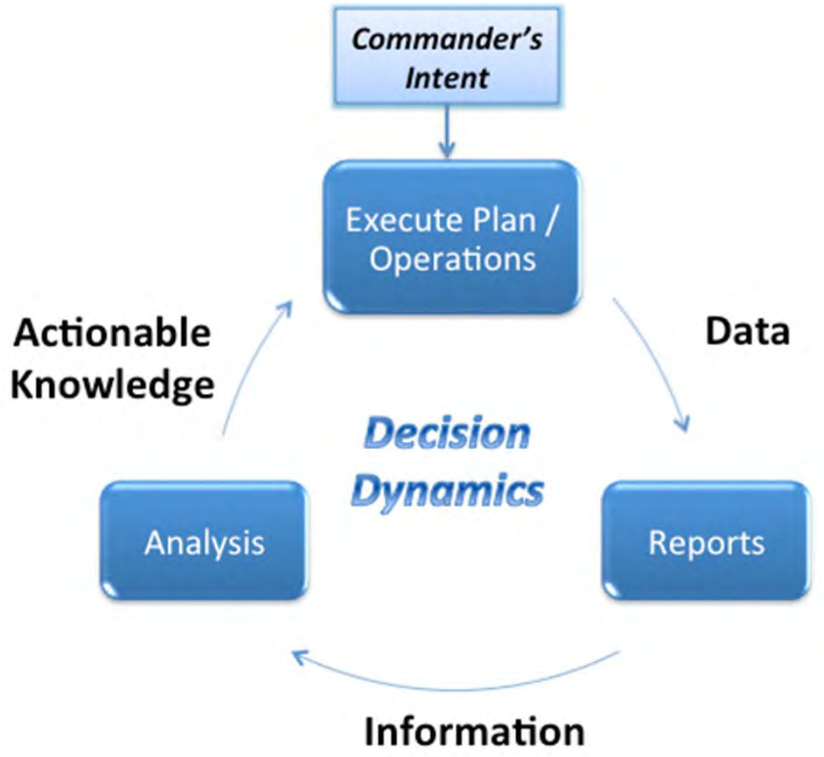
Determine recommended Courses of Action (COAs) to enhance Drivers

- Test COAs and set target measures of performance (MoP) and expected measures of effectiveness (MoE) for selected COAs



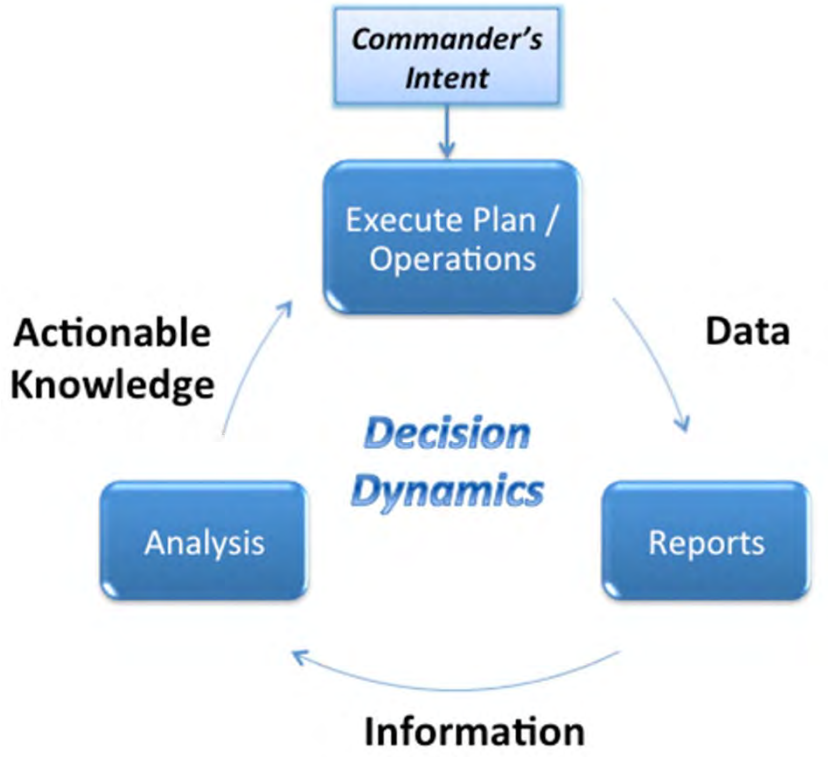
Operations

- Implement recommendations in Operational Analysis Reports (OARs)



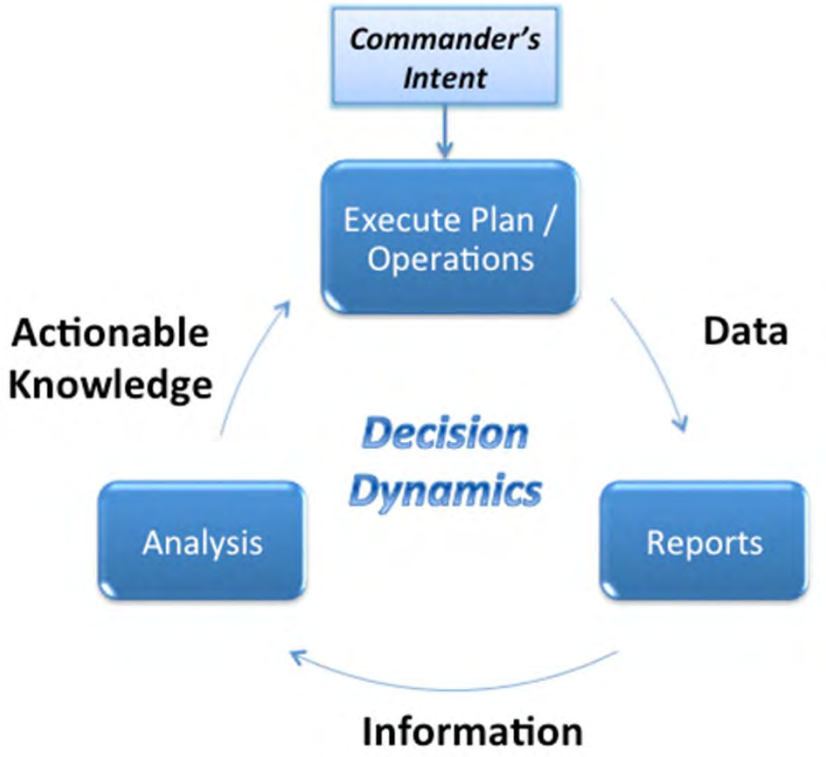
Reports

- Utilize existing BI tools to collect data
- Collect Data on:
  - Quality, time, and / or cost measures
  - Measure Driver changes / COA's by evaluating the MoP's and MoE's to determine effectiveness



Analysis

- Determine next level of drivers
- Evaluate cost, time, and quality measures
- Correlate new Drivers
- Determine new COA's and measures
- *Repeat*



Other Decision Dynamics Activities

Staff

- Balance staff assignments
- Determine optimal time for activities; i.e. *training*

Quality

- Ensure patients receive enough time with providers
- Determine quality Drivers and improve; i.e. *average years experience of provider team*

Space

- Determine probable capacity by service and forecast space requirements